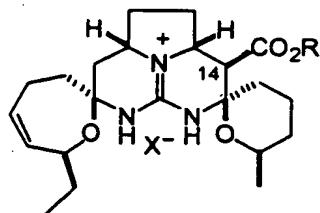


**What is Claimed:**

1. A compound of the formula:



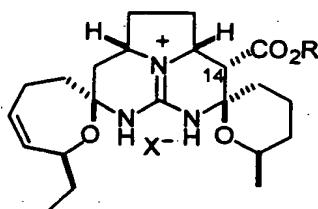
5 Wherein,

R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion.

10

2. A compound of the formula:



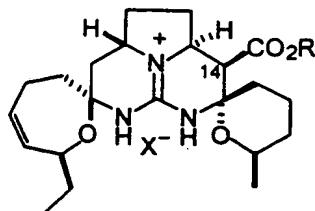
15 Wherein,

R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion.

20

3. A compound of the formula:



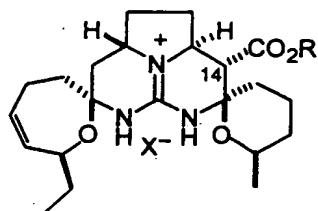
5 Wherein,

R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion.

10

4. A compound of the formula:



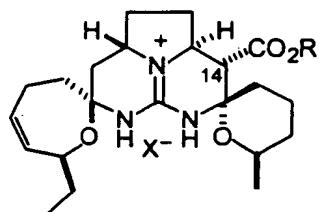
15 Wherein,

R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion.

20

5. A compound of the formula:



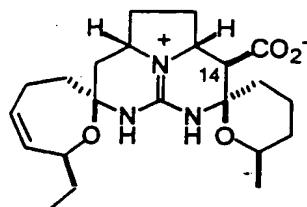
5

Wherein,

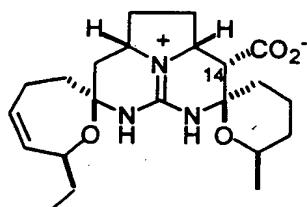
R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

10 X= any pharmaceutically acceptable counterion.

6. A compound of the formula:



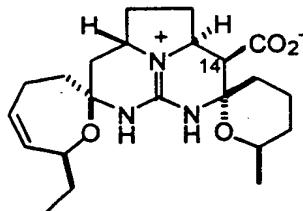
15 7. A compound of the formula:



20

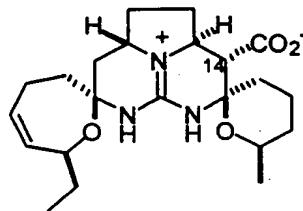
8. A compound of the formula:

5

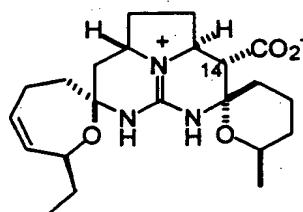


9. A compound of the formula:

10

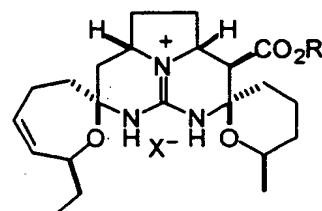


10. A compound of the formula:



11. A method for synthesizing a pentacyclic compound of the formula:

15



Wherein,

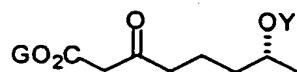
5

R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion

10

which method comprises reacting a compound of the formula:

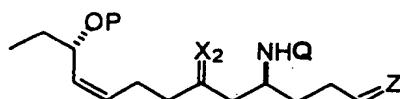


wherein G= a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or and  $\omega$ -alkoxycarboxylic acid ester, and

Y= alcohol protecting group

15

with a compound of the formula:



wherein

X<sub>2</sub>= O or ketone protecting group

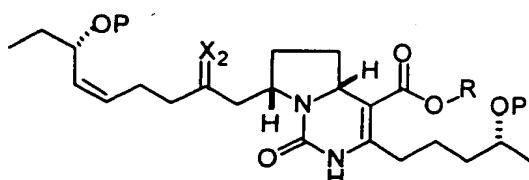
Z= alkene or carbonyl protecting group

P= alcohol protecting group and

Q= amino carbonyl group

20

to produce a compound of the formula:



wherein

$X_2$  = O or ketone protecting group

P = alcohol protecting group, and

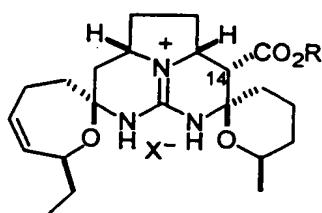
R = carboxylic acid protecting group,  $\omega$ -alkoxycarboxylic acid or  $\omega$ -alkoxycarboxylic acid ester

5

which compound is subsequently converted to the pentacyclic compound by deprotection, incorporation of ammonia, and cyclization.

10 12. The method of claim 11, wherein when R = a carboxylic acid protecting group, the method further comprises the step of deprotecting the pentacycle compound of claim 11.

13. A method for synthesizing a pentacyclic compound of the formula :



Wherein,

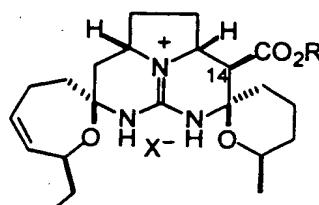
15

R = H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X = any pharmaceutically acceptable counterion,

20

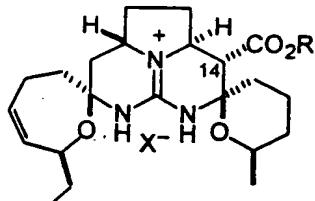
which comprises epimerizing the stereocenter at carbon-14 of the compound of the formula:



14. The method of claim 13, wherein when R= a carboxylic acid protecting group, the  
5 method further comprises the step of deprotecting the pentacycle compound of claim 13.

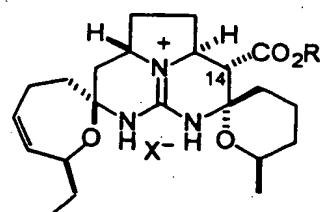
15. A method for synthesizing pentacyclic compounds B and C of the formulae:

10



B

15



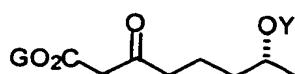
C

Wherein,

20 R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

X= any pharmaceutically acceptable counterion,

which comprises reacting a compound of the formula:

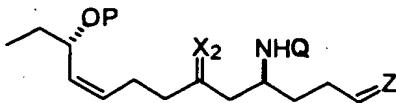


25

wherein G= a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

Y= an alcohol protecting group

with a compound of the formula:



wherein

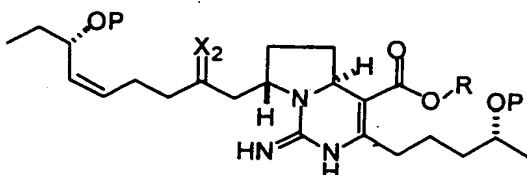
5  $X_2$ = O or a ketone protecting group

$Z$ = an alkene or carbonyl protecting group

$P$ = an alcohol protecting group, and

$Q$ = an amidinyl group

To produce a compound of the formula:



10 wherein

$X_2$ = O or a ketone protecting group

$P$ = an alcohol protecting group and

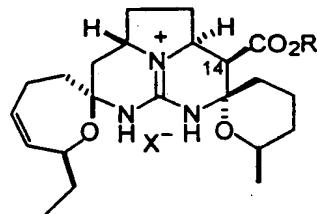
15  $R$ = a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester

which is subsequently converted to the pentacyclic compound by deprotection and cyclization.

16. The method of claim 15, wherein when  $R$ = a carboxylic acid protecting group, the  
20 method further comprises the step of deprotecting the pentacycle compound B of claim  
15.

17. The method of claim 15, wherein when R= a carboxylic acid protecting group, the method further comprises the step of deprotecting the pentacycle compound C of claim 15.

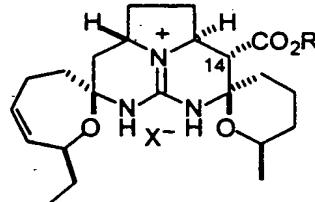
5 18. A method for synthesizing a pentacyclic compound of the formula:



R= H, a carboxylic acid protecting group, an  $\omega$ -alkoxycarboxylic acid or an  $\omega$ -alkoxycarboxylic acid ester, and

10 X= any pharmaceutically acceptable counterion.

which comprises epimerizing the stereocenter at carbon-14 and carbon 15 of the compound of the formula:



15

19. The method of claim 18, wherein when R= a carboxylic acid protecting group, the method further comprises the step of deprotecting the pentacycle compound of claim 18.

20 20. The compound of claim 1, 2, 3, 4, or 5 wherein R= allyl and X= Cl<sup>-</sup>

21. The compound of claim 1, 2, 3, 4, or 5 wherein R=H, and X= Cl<sup>-</sup>.

22. The compound of claim 1, 2, 3, 4, or 5 wherein  $R = (CH_2)_{15}CO_2G$ ,  
Wherein  $G = H$ , a counterion of a carboxylate salt, or a carboxylic acid protecting  
group, and  $X = Cl^-$

5 23. The compound of claim 1, wherein  $R = (CH_2)_{15}CO_2H$  and  $X = Cl^-$ .

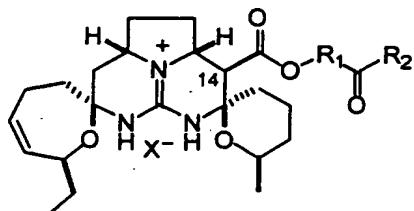
24. The compound of claim 2, wherein  $R = (CH_2)_{15}CO_2H$  and  $X = Cl^-$ .

10 25. The compound of claim 3, wherein,  $R = (CH_2)_{15}CO_2H$  and  $X = Cl^-$ .

26. The compound of claim 4, wherein  $R = (CH_2)_{15}CO_2H$  and  $X = Cl^-$ .

15 27. The compound of claim 5, wherein  $R = (CH_2)_{15}CO_2H$  and  $X = Cl^-$ .

28. A compound of the formula:



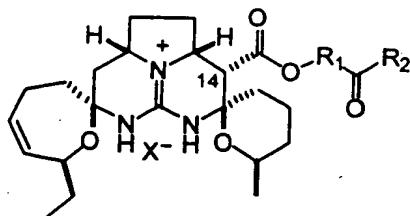
wherein  $R_1 =$  any alkyl, aryl or substituted alkyl group

$R_2 = O^-, OH, OG_1$ , a spermidine moiety or a substituted spermidine moiety

20 wherein  $G_1 =$  a carboxylic acid protecting group and

$X =$  any pharmaceutically acceptable counterion.

29. A compound of the formula:



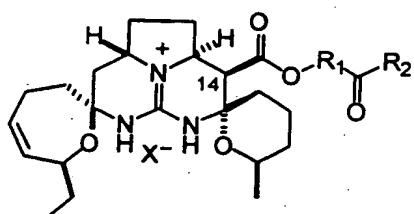
wherein  $R_1$  = any alkyl, aryl or substituted alkyl group

5  $R_2$  =  $O^-$ ,  $OH$ ,  $OG_1$ , a spermidine moiety or a substituted spermidine moiety

wherein  $G_1$  = a carboxylic acid protecting group and

$X$  = any pharmaceutically acceptable counterion.

10 30. A compound of the formula:



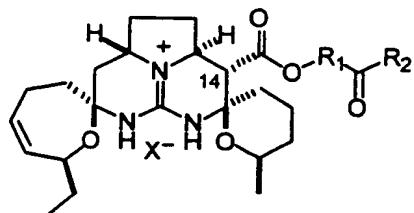
wherein  $R_1$  = any alkyl, aryl or substituted alkyl group

15  $R_2$  =  $O^-$ ,  $OH$ ,  $OG_1$ , a spermidine moiety or a substituted spermidine moiety

wherein  $G_1$  = a carboxylic acid protecting group and

$X$  = any pharmaceutically acceptable counterion.

31. A compound of the formula:



wherein  $R_1$  = any alkyl, aryl or substituted alkyl group

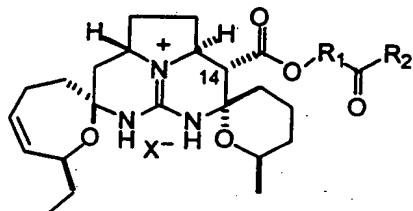
$R_2$  =  $O^-$ , OH,  $OG_1$ , a spermidine moiety or a substituted spermidine moiety

wherein  $G_1$  = carboxylic acid protecting group, and

$X$  = any pharmaceutically acceptable counterion.

10

32. A compound of the formula:



wherein  $R_1$  = any alkyl, aryl or substituted alkyl group

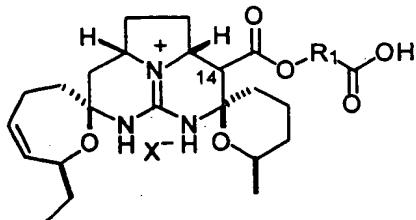
$R_2$  =  $O^-$ , OH,  $OG_1$ , a spermidine moiety or a substituted spermidine moiety

15

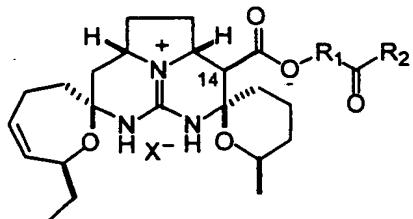
wherein  $G_1$  = carboxylic acid protecting group and

$X$  = any pharmaceutically acceptable counterion.

33. The method of claim 11, wherein when R is an  $\omega$ -alkoxycarboxylic acid, the method further comprises the step of reacting the pentacyclic compound of the formula:

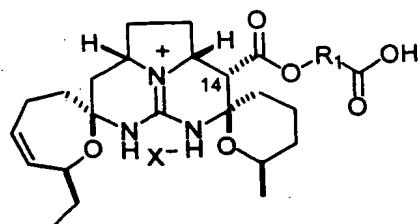


5       wherein, R<sub>1</sub>= any alkyl, aryl or substituted alkyl group with a protected spermidine or a protected substituted spermidine and subsequently deprotecting to produce the compound of the formula:



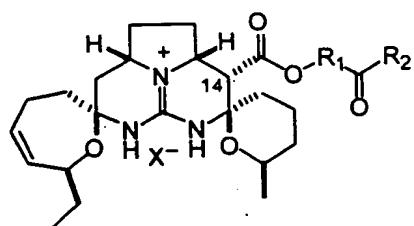
10     wherein R<sub>1</sub>= any alkyl, aryl or substituted alkyl group  
R<sub>2</sub>= a spermidine moiety or a substituted spermidine moiety and  
X= any pharmaceutically acceptable counterion.

34. The method of claim 13, wherein when R is an  $\omega$ -alkoxycarboxylic acid the method further comprises the step of reacting the pentacyclic compound of the formula:



5

with a protected spermidine or a protected substituted spermidine and subsequently deprotecting to produce the compound of the formula:



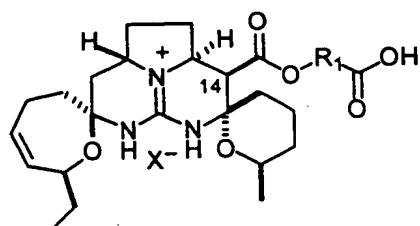
wherein R<sub>1</sub> = any alkyl, aryl or substituted alkyl group

10

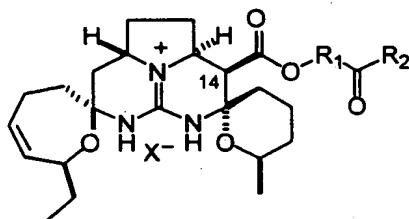
R<sub>2</sub> = a spermidine moiety or a substituted spermidine moiety, and

X = any pharmaceutically acceptable counterion.

35. The method of claim 15, wherein when R is an  $\omega$ -alkoxycarboxylic acid the method further comprises the step of reacting the pentacyclic compound of the formula:



wherein,  $R_1$ = any alkyl, aryl or substituted alkyl group  
with a protected spermidine or a protected substituted spermidine and subsequently  
deprotecting to produce the compound of the formula:

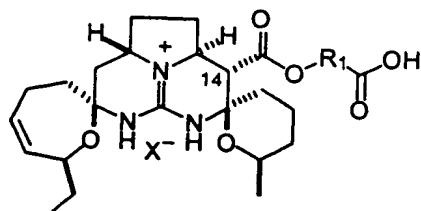


5

wherein  $R_1$ = any alkyl, aryl or substituted alkyl group  
 $R_2$ = a spermidine moiety or a substituted spermidine moiety and  
 $X$ = any pharmaceutically acceptable counterion.

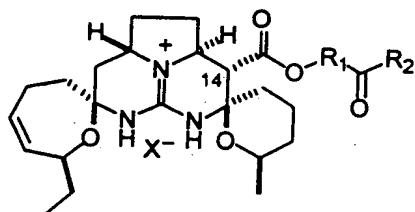
10

36. The method of claim 15, wherein when R is an  $\omega$ -alkoxycarboxylic acid the method further comprises the step of reacting the pentacyclic compound of the formula:



5

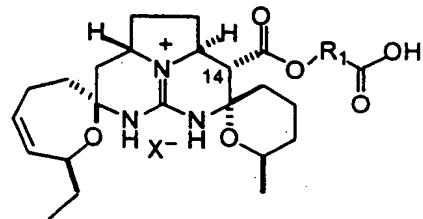
wherein, R<sub>1</sub>= any alkyl, aryl or substituted alkyl group with a protected spermidine or a protected substituted spermidine and subsequently deprotecting to produce the compound of the formula:



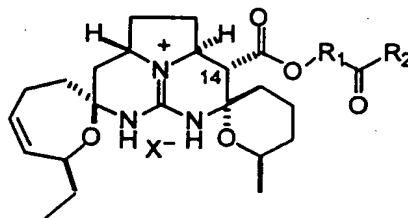
10

wherein R<sub>1</sub>= any alkyl, aryl or substituted alkyl group  
R<sub>2</sub>= a spermidine moiety or a substituted spermidine moiety and  
X= any pharmaceutically acceptable counterion.

37. The method of claim 18, wherein when R is an  $\omega$ -alkoxycarboxylic acid the method further comprises the step of reacting the pentacyclic compound of the formula:

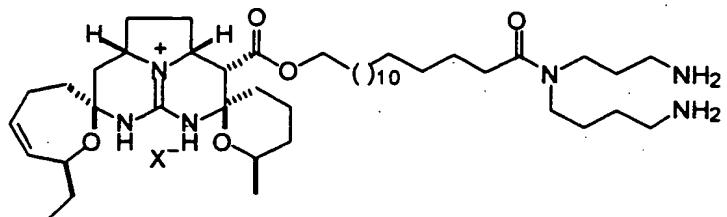


5 wherein, R<sub>1</sub>= any alkyl, aryl or substituted alkyl group with a protected spermidine or a protected substituted spermidine and subsequently deprotecting to produce the compound of the formula:



10 wherein R<sub>1</sub>= any alkyl, aryl or substituted alkyl group  
R<sub>2</sub>= a spermidine moiety or a substituted spermidine moiety and  
X= any pharmaceutically acceptable counterion.

38. A method for synthesizing Ptilomycalin of the formula:

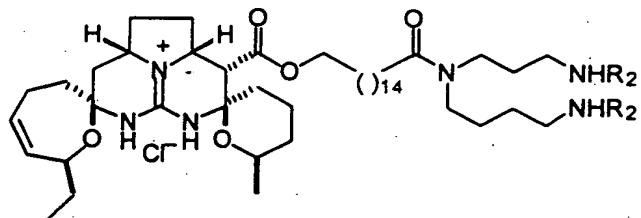


ptilomycalin A

5 which comprises reacting the pentacyclic compound of claim 22 with the compound of the formula:



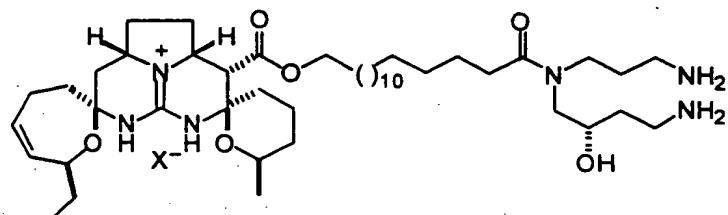
wherein R<sub>2</sub> = an amine protecting group  
to produce a compound of the formula:



10

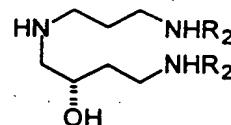
which is subsequently deprotected to produce Ptilomycalin A.

39. A method for synthesizing Crambescidin 800 of the formula:



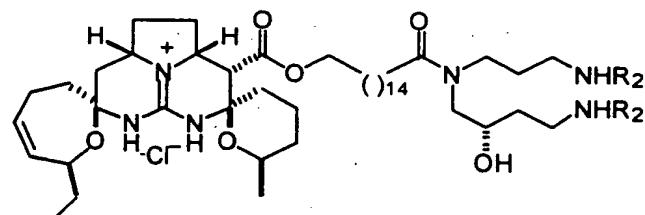
crambescidin 800

which comprises reacting the pentacyclic compound of claim 22 with the compound  
5 of the formula:



wherein R2= an amine protecting group

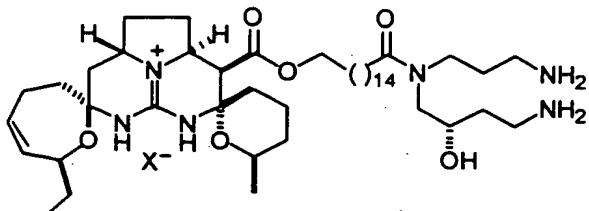
to produce a compound of the formula:



10

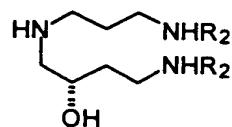
which is subsequently deprotected to produce Crambescidin 800.

40. A method for synthesizing 13, 14, 15-Isocrambescidin 800 of the formula:



13,14,15-isocrambescidin 800

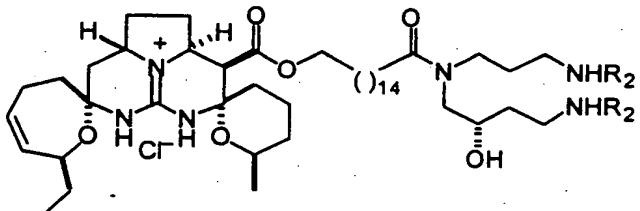
which comprises reacting the pentacyclic compound of claim 24 with the compound of the formula:



5

wherein  $R_2$  = an amine protecting group

to produce a compound of the formula:



10

which is subsequently deprotected to produce 13, 14, 15-Isocrambescidin 800.

41. An antitumor composition comprising a compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 in admixture with a pharmaceutically acceptable carrier.

15

42. An antiviral composition comprising a compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 in admixture with a pharmaceutically acceptable carrier.

43. An antifungal composition comprising a compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 in admixture with a pharmaceutically acceptable carrier.
44. A method for treating tumors comprising administering to a subject in need of said treatment, an effective amount of compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.
45. A method for treating viral infections comprising administering to a subject in need of said treatment, an effective amount of compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.
46. A method for treating fungal infections comprising administering to a subject in need of said treatment, an effective amount of compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.